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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/919,679	08/01/2001	Juliana H.J. Brooks	BLP:101 (a) US-CIP	6650

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EXAMINER
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HANLEY, SUSAN MARIE

ART UNIT	PAPER NUMBER
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1651

DATE MAILED: 02/28/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/919,679

Applicant(s)

BROOKS ET AL.

Examiner

Susan Hanley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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## DETAILED ACTION

### *Response to Amendment*

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

The amendment filed 6/1/05 has been entered.

Claims 1-15 are pending.

### *Response to Arguments*

Applicant's arguments filed 6/1/05 have been fully considered but they are not persuasive. Applicant's arguments, see pages 6-8 of the response, filed 1/25/06, with respect to the rejection(s) of claim(s) 1-15 under 35 USC § 102 (Lichtin and Pratt rejections) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of newly found prior art.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 7-9 and 13 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tsutsui et al. (US 4,287,036; "Tsutsui").

Tsutsui discloses a catalytic method for reducing chemical compounds in solution utilizing a transition metal alcoholate complex as the reducing agent augmented by exposure to a selected wavelength and intensity of light that regenerates the catalysts by photo-reduction *in situ*. The method comprises selecting an appropriate wavelength of radiation by reference to the absorption, emission and excitation spectra of the transition metal alcoholate complex solution to be of an intensity capable of inducing reduction of the metal to the desired active state. The main factors to consider for selection of the appropriate wavelength of radiation are the maximization of the absorption of the selected radiation, the maximization of the vibrational degradation process of the complex, resulting in fluorescence and the minimization of the disassociation complex (col. 4, lines 15-26). Tsutsui discloses that any skilled technician can make the determination of the wavelength appropriate for the desired transition metal alcoholate by studying the absorption, emission and excitation spectra of said catalyst (col. 5, lines 40-58). This disclosure meets the limitations of part a) of instant claim 1, as well as part (i) of instant claim 13 because Tsutsui teaches that at least three types of spectral patterns (emission, absorption and excitation) of the catalyst are generated and then further teaches how to select the appropriate wavelength. The appropriate wavelength is usually in the UV range, which meets instant claims 3 and 8 (directed to spectroscopy method; see col. 5, lines 58-60 of Tsutsui). The catalyst comprises the metal ion salt of iron or ruthenium which meets the limitations of a metal salt (instant claim 2) and types of metals (instant claim 9). Tsutsui discloses an example in which the reaction is effected by combining the catalyst (vanadium (III) methanolate) with the substrate (catechol) and irradiation the mixture at 313 nm for six days (col. 6, lines 15-39). This disclosure meets the remaining limitations of parts b) and c) of instant claim 1 and claim 13 because a chemical reaction mixture was formed and a frequency of light (313 nm) was shown on the reaction mixture by a UV source. Instant claim 1 does not specify the components of the chemical reaction system. Thus, the presence of the catalyst and substrate are interpreted to fulfill the limitation of the

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reaction system since they are both required for the reaction to take place. The nature of the augmentation by the duplicated frequency recited in instant claim 1 is not specific. The fact that the duplicated frequency regenerates the catalyst is considered to augment or help the reaction. Tsutsui teaches that the catalyst and substrate are combined before exposure to the duplicated frequency, thus satisfying the limitation of order of exposure in instant claim 7.

Claims 1-4, 9 and 13 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Mohr (US 6,217,712).

Mohr discloses a method of using radio frequency waves to artificially create catalytic action in a catalyst-free chemical reaction within a substance. The method comprises the steps of determining the appropriate radio frequency that is substantially equal to a catalyst signal frequency of the selected catalyst. The catalyst signal frequency is the signal frequency that is determined by NMR. Mohr teaches that the ordinary artisan can determine the signal frequency of the catalyst in NMR tables. Mohr also discloses that the NMR resonance values for any element are determined by bombarding the element with external radio frequencies in the presence of a strong magnetic field such that the element emits a signal radio frequency which can be detected and definitely defines the element (col. 3, lines 40-62). This disclosure meets the limitations regarding determining an electromagnetic spectral pattern for the catalyst, as in instant claims 1 (a) and 13 (i) because the claim limitations do not specify that the identical practitioner determines the spectral pattern and selects the appropriate frequency to mimic the catalyst. Mohr teaches that the radio frequency that identifies the catalyst is selected from a table that was generated by exposing the catalyst to a range of radio frequencies to determine the optimal frequency. Thus, the exposure of the catalyst to a range of frequencies meets the limitations of determining a spectral pattern because someone does the exposing and inherently generates output that shows the radio frequencies emitted by the catalyst which is known as a spectrum. It is inherent that a spectrum is generated because simply running an NMR without taking down the pattern would require the ordinary artisan to

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rerun the spectrum every time the data is needed. The selection of the optimal radio frequency that characterizes the catalyst is found in the tables to which Mohr refers. Thus, an NMR spectrum is taken and the frequency that defines the catalyst is selected.

The selected frequency is duplicated in the reaction system to create catalytic action without the use of the catalyst. Mohr discloses that the frequency for platinum is 9.29 MHz (col. 5, lines 16-26). Said frequency was transmitted through a catalyst-free electrolysis reaction that normally requires platinum. The electrolyte cell minus the platinum was set up and the frequency signal was applied (col. 5, lines 40-60). This disclosure meets the limitations of duplicating the determined frequency and exposing a chemical reaction system to said frequency as in claims 1 b-c and claim 13 since Mohr used the determined frequency to cause catalysis to occur in a reaction system. The disclosure of the NMR frequency (radio) of a metal, platinum, meets the limitations of instant claims 2, 4 and 9. The determination of the spectral pattern by NMR meets claim 3.

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the

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examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 7-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lichtin et al. (US 4,861,484) in view of Tsutsui et al. (US 4,287,036; "Tsutsui").

Lichtin et al. disclose a method to degrade organic materials into environmentally compatible products comprising the irradiation or excitation of a transition element in a solid state with photoenergy in a reaction system that includes the organic material to be degraded and a peroxide (Lichtin patent, abstract). The photoenergy is added to the reaction mixture at wavelengths absorbable by the transition element catalyst which are most effective in enhancing the activity of said catalyst (Lichtin patent col. 12, lines 40-45). This disclosure meets, in part, the limitations of claims 1, 13 and 15 because wavelengths most effective in enhancing the activity of the catalyst is used, i.e. duplicated, to irradiate the catalyst and the chemical reaction system such that the photoenergy provides increased yields of organic material degradation in comparison to those yields obtained by conventionally known processes (Lichtin patent, col. 12, lines 55-60). The disclosure by Lichtin et al. drawn to the use of a transition metal meets the limitations of instant claim 2 drawn to a catalyst comprising a metal. Lichtin et al. teach that the metal catalyst can be platinum, which satisfies instant claim 9 and the elected specie (Lichtin patent, Table III). The Lichtin patent discloses that the photoenergy used to determine the optimal frequencies to irradiate the catalyst is defined as electromagnetic radiation of any wavelength and that UV or visible light is preferred as required by instant claims 4 (drawn to irradiation in the UV range), 3 and 8 which are drawn to UV spectroscopy to determine the desired wavelength. Lichtin et al. teach that water can be purified by combining polluted water with a solid catalyst and peroxide to form a reaction mixture. The reaction mixture components are then simultaneously irradiated to produce potable water (col. 7, lines 4-15). This disclosure meets the requirements of claims 7 and 12 which are drawn to the combination of the catalysts prior to or substantially simultaneously with irradiation.

Lichtin et al. do not specifically teach that a spectrum of the catalyst was obtained to determine the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the catalyst.

The disclosure by Tsutsui is disclosed *supra*. Briefly, Tsutsui teaches the selection of wavelength(s) and intensity of light that regenerates a metal catalyst alcoholate complex by photo-reduction *in situ*. The method comprises selecting an appropriate wavelength of radiation by reference to the absorption, emission and excitation spectra of the transition metal alcoholate complex solution to be of an intensity capable of inducing reduction of the metal to the desired active state. The main factors to consider for selection of the appropriate wavelength of radiation are the maximization of the absorption of the selected radiation, the maximization of the vibrational degradation process of the complex, resulting in fluorescence and the minimization of the disassociation complex (col. 4, lines 15-26). Tsutsui discloses that any skilled technician can make the determination of the wavelength appropriate for the desired transition metal alcoholate by studying the absorption, emission and excitation spectra of said catalyst (col. 5, lines 40-58). Excitation at the charge-transfer transition band from the ligand the metal is desired. It is important to use the correct wavelength because excitation with a shorter wavelength may cause dissociation of the transition state metal complex and with a longer wavelength, the dissociation may compete with vibrational degradation of the complex resulting in fluorescence (col. 13, lines 53-58). This disclosure meets the limitations of part a) of instant claim 1, as well as part (i) of instant claim 13 because Tsutsui teaches that at least three types of spectral patterns (emission, absorption and excitation) of the catalyst are generated and then further teaches how to select the appropriate wavelength in order to avoid competing side processes.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure the UV spectra of the catalyst of Lichtin and use it to determine the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the catalyst. The ordinary artisan would have been motivated to do so because Tsutsui teaches that the selection of the frequency



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that causes the charge transfer is distinct and that the inclusion of longer or shorter wavelengths in the wavelength to be used for the reaction causes side processes that lead to degradation of the catalyst. The ordinary artisan would have had a reasonable expectation that the ordinary artisan could have determined the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the catalyst because Tsutsui specifically discloses that that "any skilled technician can make the determination of the wavelength appropriate for the desired transition metal alcoholate by studying the absorption, emission and excitation spectra of said catalyst" (col. 5, lines 40-58). "Any skilled technician" is interpreted to mean a person that knows how to carry out the procedure for a reaction.

In the response of 1/25/06, Applicant argues that Lichtin does not teach all of the claim elements because the steps of determining with the spectral pattern of the catalyst and duplicating at least one frequency are not expressly stated. Applicant further argues that Lichtin most likely uses a broad spectrum UV-Vis radiation that is typical of photochemistry radiation used in the art. Applicant also points out the definition of "spectral pattern" and the amended language of instant claim 13 wherein that includes a Markush group related to the selection of the frequency.

Responding to Applicant's argument regarding the Lichtin's lack of explicit disclosure of the determination of the spectral pattern and the duplication of the appropriate wavelength, the inclusion of Tsutsui discloses how the ordinary artisan would select the best wavelength(s) from various spectra (or spectral patterns) of the catalyst to effect the desired change in said catalyst and then duplicate the selected wavelengths for the reaction. Tsutsui also provides motivation for choosing and duplication the most appropriate wavelengths because the employment of wavelengths that are shorter or longer than the optimal to be used for the reaction causes side processes that lead to degradation of the catalyst. Therefore, the combination of Lichtin and Tsutsui disclose the selection and duplication of the most appropriate wavelength(s) or frequency(ies) of a spectrum related to a catalyst to augment said catalyst.

Claims 1, 3, 4, 7, 8 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pratt, Jr. (US 4,115,280; "Pratt") in view of Vladimirov (1988, abstract only) and Cronheim (1937; abstract only).

Pratt discloses a method of activating macromolecular species, such as enzymes which are catalysts, comprising subjecting an enzyme-containing reaction mixture to laser radiation at a frequency that excites the vibrational and rotational state of said enzyme. Pratt teaches that the frequency and the amplitude of the laser output radiation is controlled to selectively affect the macromolecular catalyst (col. 10, lines 20-35). The employment of a laser meets the limitation of instant claim 10. The wavelength for irradiation is determined by subjecting said macromolecule to laser radiation and measuring the scattered or transmitted or reflected radiation as a function of frequency amplitude (col. 11, lines 60-68). The radiation frequency for activation the catalyst can be in the Raman scattering range (Pratt patent, col. 7, lines 25-60) which meets the limitation for the spectroscopy method of instant claims 3, 4 and 8. The selectivity of the frequency control can be enhanced by non-linear coupling of vibrating molecule of the species to the electromagnetic field (Pratt patent, col. 9, lines 60-68 to col. 10, lines 1-2). Enhancing the catalytic activity by controlling non-linear coupling vibrations of the catalyst is equivalent to employing at least one harmonic frequency of said catalyst as required by claim 13, part (ii), first instance. Pratt discloses that the catalyst can be irradiated before, simultaneously or after combination with the reactant system (Pratt patent, col. 3, lines 32-40 and col. 11, lines 17-60), which meets the reaction order limitations of instant claims 7, 11 and 12.

Pratt does not specifically teach that a spectrum of the enzyme was obtained to determine the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the catalyst.

Vladimirov discloses that the incubation of superoxide dismutase (SOD) at pH 5.9 for 2 hours leads to its inactivation. Irradiation of the inactivated SOD by a He-Ne laser reactivated the enzyme. ESR and absorption spectra taken after the low pH incubation and subsequent restoration of activity showed a red shift in the maxima of the enzyme. This red shift corresponded with a model system. Vladimirov

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postulated that the photoreactivation of SOD consists of the deprotonation of His-61 in the active site and subsequent recovery of the imidazole bridge between the Cu and Zn which had been destroyed by the low pH. Thus, the teaching by Vladimirov demonstrates that it was known in the art to determine spectral patterns of enzymes and to associate changes in absorption frequencies with the activity and structure of the enzyme.

Cronheim teaches that the activity of enzymes in various processes is influenced by the wavelength and the intensity of the light to which the process is subjected. Cronheim reports that proteases in flour and the decomposition of hydrogen peroxide by catalase are both activated by visible light. The wavelength of light can increase or decrease catalysis in fermentation processes. The wavelength of light that corresponds to the absorption bands in preparations of catalase (visible region) causes an increase in such catalytic fermentation processes. Fermentative ester-splitting can be activated by blue light. Therefore, the disclosure by Cronheim demonstrates that the ordinary artisan would recognize that only certain wavelength(s) of light in the spectrum achieve augmentation of catalysis.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to measure the spectral patterns comprising the vibrational and rotational state of the enzyme catalyst of Pratt and to determine the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the enzyme. The ordinary artisan would have been motivated to do so because the combined disclosure by Vladimirov and Cronheim demonstrates that it was known in the art to determine spectral patterns of enzymes and to associate changes in absorption frequencies with the activity of the enzyme and that the ordinary artisan would recognize that only certain wavelength(s) of light in the spectrum achieve augmentation of catalysis. The ordinary artisan would have had a reasonable expectation that the ordinary artisan could have determined the optimum wavelength(s) or frequency(ies) that comprise the spectral pattern that is duplicated to augment the catalyst because Vladimirov shows that it was well known in the art to determine absorption maxima of enzymes from ESR and absorption spectral patterns.

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In the response of 1/25/06, Applicant argues that Pratt does not teach all of the claim elements regarding the language of the "spectral pattern" and that the determination of the spectral patterns of the at least one physical catalyst is very specific and does not include the spectra of the entire reaction system. Responding to Applicant's argument regarding the disclosure of the spectral pattern, the rejection based on Pratt has been changed to an obviousness rejection *supra*. Responding to Applicant argument regarding the determination of the spectral pattern of the catalyst vs. the entire reaction system, Pratt teaches that "the species are subjected to laser irradiation at a frequency that excites the vibrational and rotational states thereof" wherein "species" means a macromolecule which includes enzymes (col. 4, lines 33-45). Clearly, Pratt is directed to irradiation of the macromolecular specie in order to augment its action.

No claim is allowed.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Susan Hanley whose telephone number is 571-272-2508. The examiner can normally be reached on M-F 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Susan Hanley  
Patent Examiner  
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SANDRA E. SAUCER  
PRIMARY EXAMINER  
